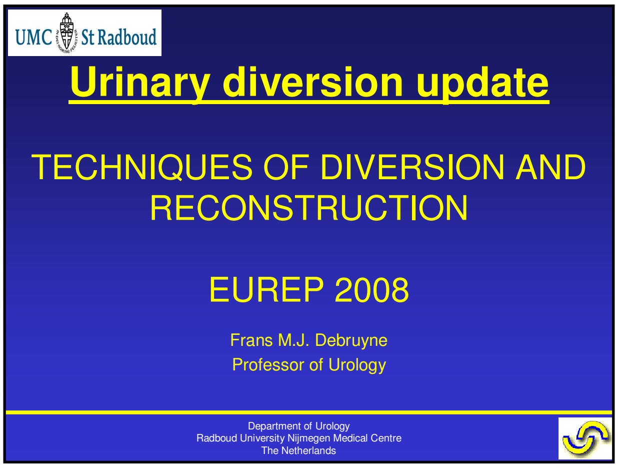
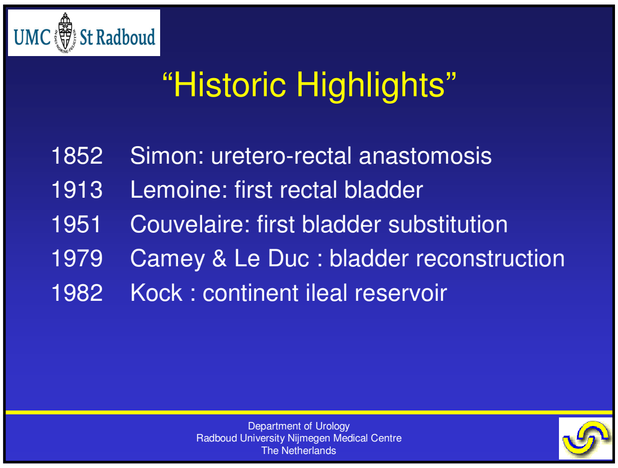


Urinary diversion update

TECHNIQUES OF DIVERSION AND RECONSTRUCTION

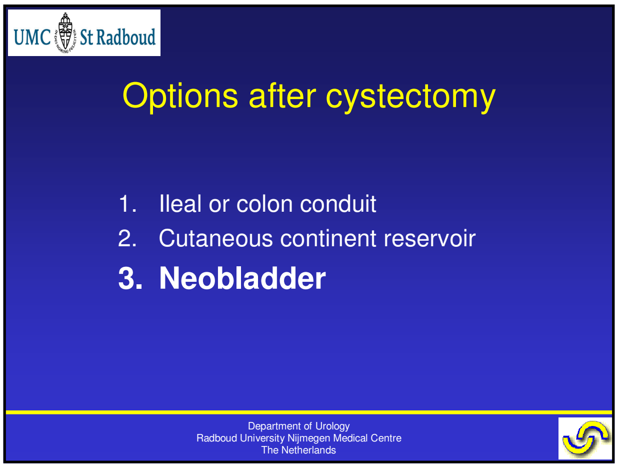
EUREP 2008

Frans M.J. Debruyne
Professor of Urology



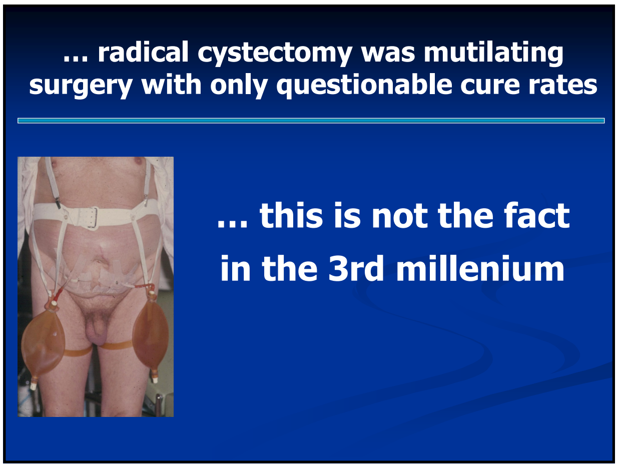
"Historic Highlights"

1852	Simon: uretero-rectal anastomosis
1913	Lemoine: first rectal bladder
1951	Couvelaire: first bladder substitution
1979	Camey & Le Duc : bladder reconstruction
1982	Kock : continent ileal reservoir



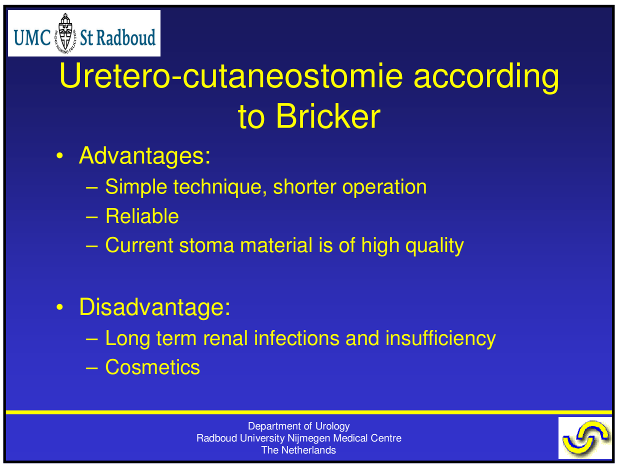
Options after cystectomy

1. Ileal or colon conduit
2. Cutaneous continent reservoir
3. **Neobladder**



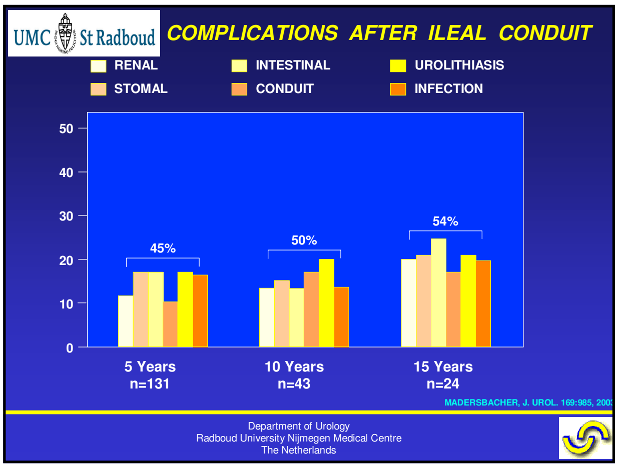
... radical cystectomy was mutilating surgery with only questionable cure rates

... this is not the fact in the 3rd millenium



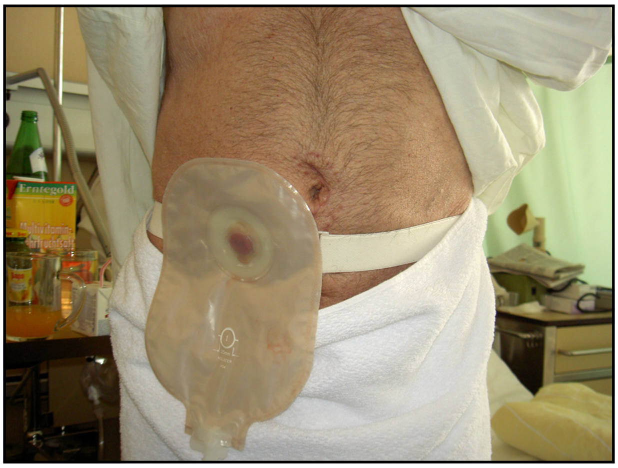
Uretero-cutaneostomie according to Bricker

- Advantages:
  - Simple technique, shorter operation
  - Reliable
  - Current stoma material is of high quality
- Disadvantage:
  - Long term renal infections and insufficiency
  - Cosmetics



COMPLICATIONS AFTER ILEAL CONDUIT

MADERSBACHER, J. UROL. 169:985, 200



UMC St Radboud

Continent Pouch

- Advantage:
  - No stoma material
- Disadvantages
  - Major operation, more bowel needed, also colon needed (ca, metabolic)
  - Technically difficult (valve, ileal tapering)
  - Less reliable (leakage, stenosis)
  - In best case scenario need for CIC

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Radboud University Nijmegen Medical Centre
The Netherlands

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Indiana pouch

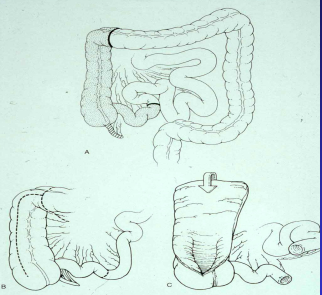

Figure 1. *A,* The ileum is marked 10 cm from the ileocecal valve and the colon is marked 25 to 30 cm from the ileocecal junction. *B and C,* The colonic segment is incised on its antimesenteric border for 95% of its entirety.

Illustration continued on following page

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Indiana pouch

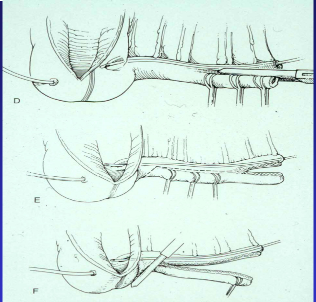

Figure 1 *(Continued). D–F,* Gastrointestinal stapling devices are used to taper the efferent limb and to excise excess ileum.

Illustration continued on following page

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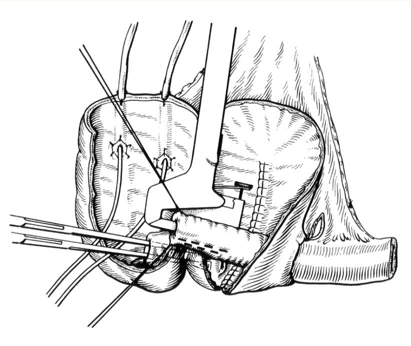
ILEOCECAL POUCH (MAINZ I)



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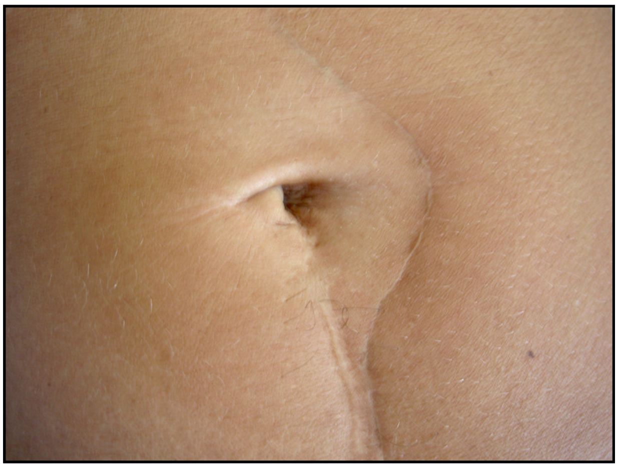
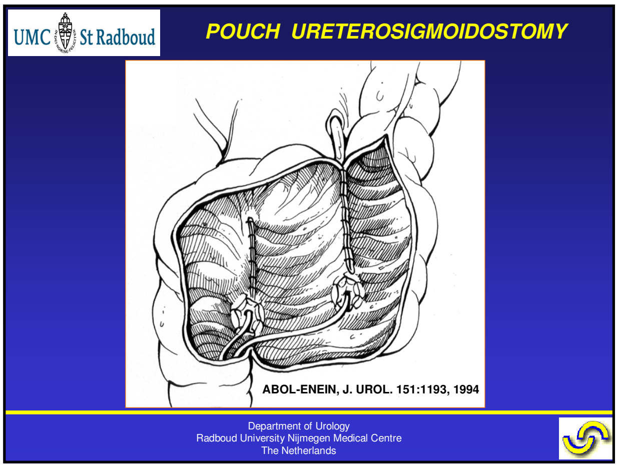
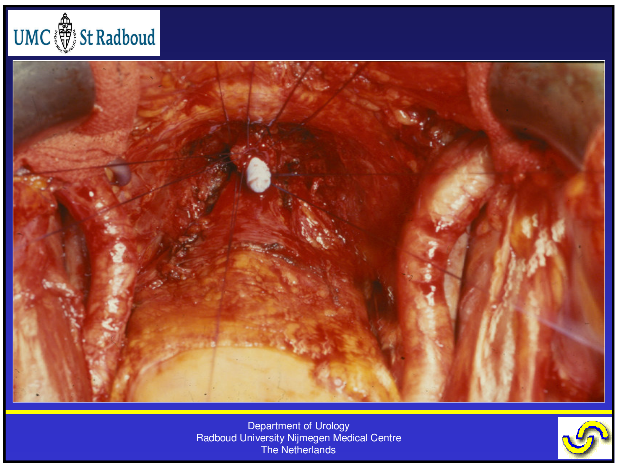




POUCH URETEROSIGMOIDOSTOMY

ABOL-ENEIN, J. UROL. 151:1193, 1994

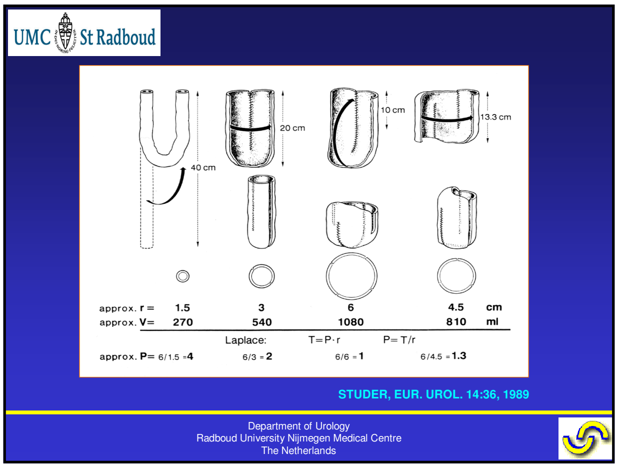


We can spare the urethra,
so why not use it??

Orthotopic Bladder Replacement

Mechanical aspects

• Co-figuration	→	capacity
• Accommodation	→	mural tension
• Wall characteristics	→	compliance
• Contractility	→	bowel motor functions

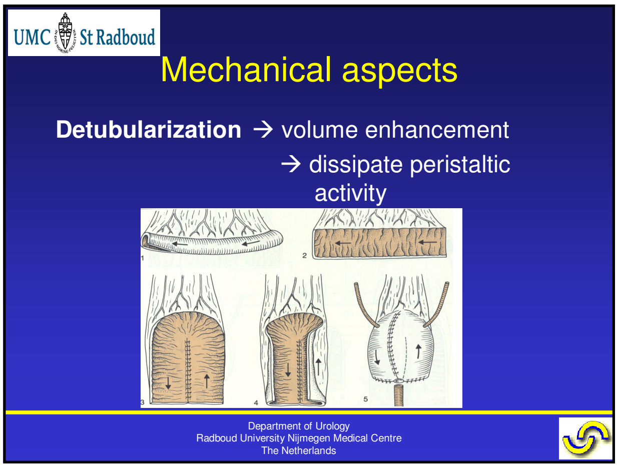


approx. **r =**	**1.5**	**3**	**6**	**4.5**	**cm**
approx. **V=**	**270**	**540**	**1080**	**810**	**ml**

Laplace: $T = P \cdot r$ $P = T/r$

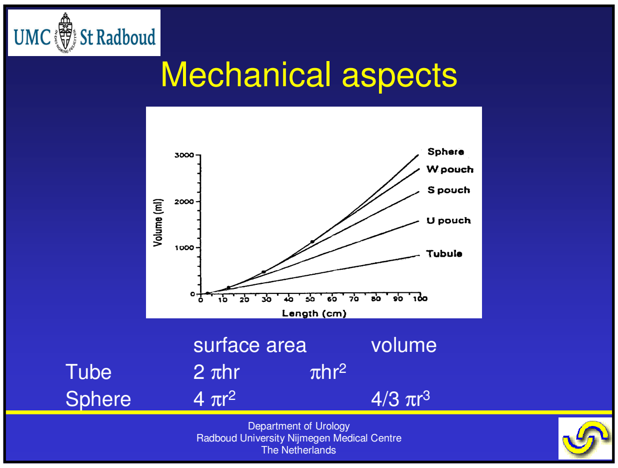
approx. **P=** 6/1.5 =**4** 6/3 = **2** 6/6 = **1** 6/4.5 = **1.3**

STUDER, EUR. UROL. 14:36, 1989



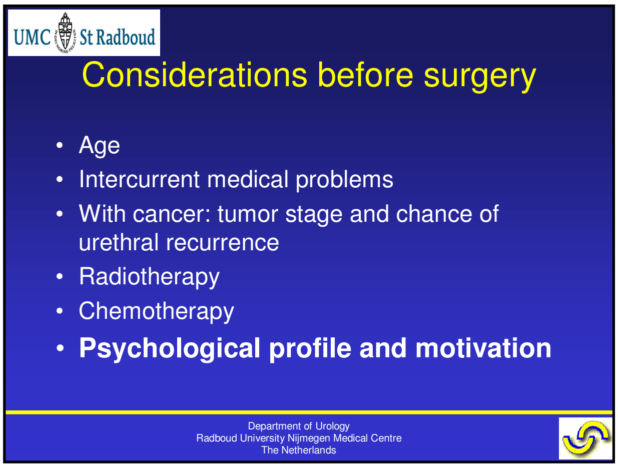
Mechanical aspects

Detubularization → volume enhancement
→ dissipate peristaltic activity



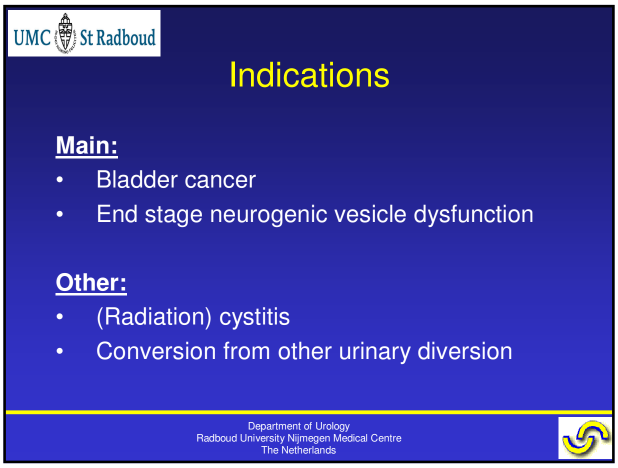
Mechanical aspects

	surface area	volume
Tube	$2 \pi hr$	πhr^2
Sphere	$4 \pi r^2$	$4/3 \pi r^3$



Considerations before surgery

- Age
- Intercurrent medical problems
- With cancer: tumor stage and chance of urethral recurrence
- Radiotherapy
- Chemotherapy
- **Psychological profile and motivation**



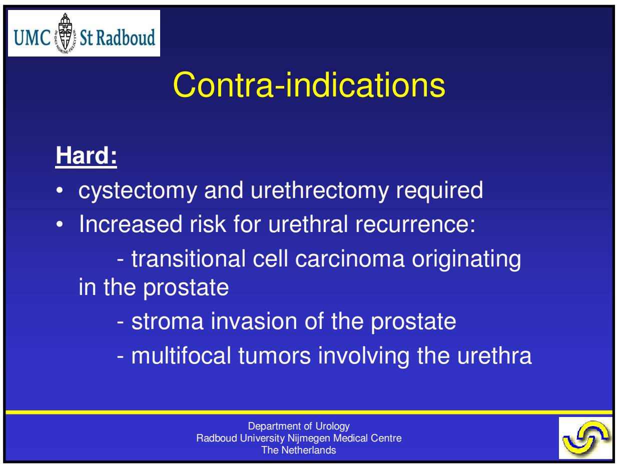
Indications

Main:

- Bladder cancer
- End stage neurogenic vesicle dysfunction

Other:

- (Radiation) cystitis
- Conversion from other urinary diversion



Contra-indications

Hard:

- cystectomy and urethrectomy required
- Increased risk for urethral recurrence:
  - transitional cell carcinoma originating in the prostate
  - stroma invasion of the prostate
  - multifocal tumors involving the urethra

Contra-indications

Probable hard:

- Involvement of bladder neck
- Severe dysplasia or C.I.S. of prostatic urethra

Contra-indications

Relative:

- Positive lymph nodes
- Compromised renal function
- Inflammatory bowel disease
- Elderly patients without help at home
- Patients who do not tolerate C.I.C.

“Basic rule”

Psychological “fitness” more important than chronological age

---

Continence

Depending on:

- Preservation of distal urethral sphincter function
- Low pressure neobladder

However:

- Nocturnal incontinence is a common finding despite technically sound operations

---

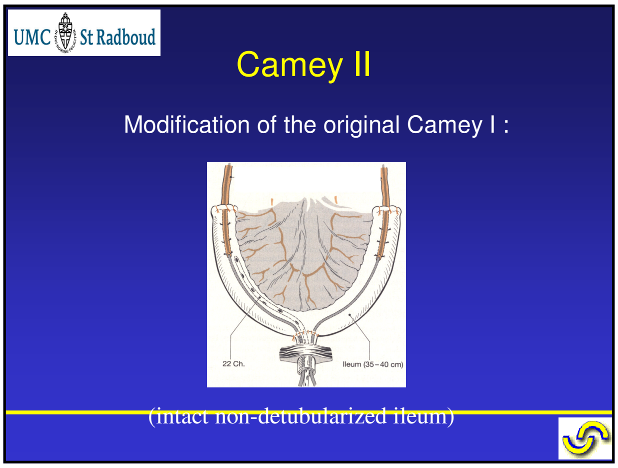
Causes of nocturnal incontinence

- Minor injury to distal sphincter
- Interruption of normal micturation reflex after bladder removal
- Hypertonic urine → fluid shift into neobladder → increased volume and pressure → predisposing to leakage
- Lower external sphincter closure pressure at night

Selection of reservoir type

- **Ileal** reservoir
  (Camey II, Hautmann, Hemi-Kock, Studer)
- **Ileocolonic** reservoir
  (Mainz-pouch, Le Bag pouch)
- **Colonic** reservoir
  (right colon reservoir, sigmoïd neobladder)

In addition: numerous variations described



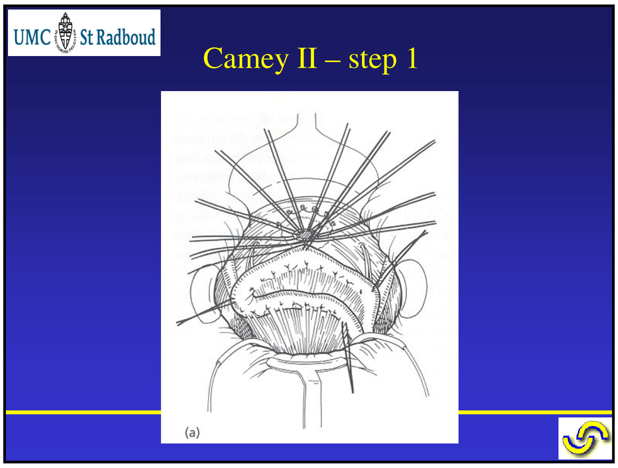
Camey II

Modification of the original Camey I :

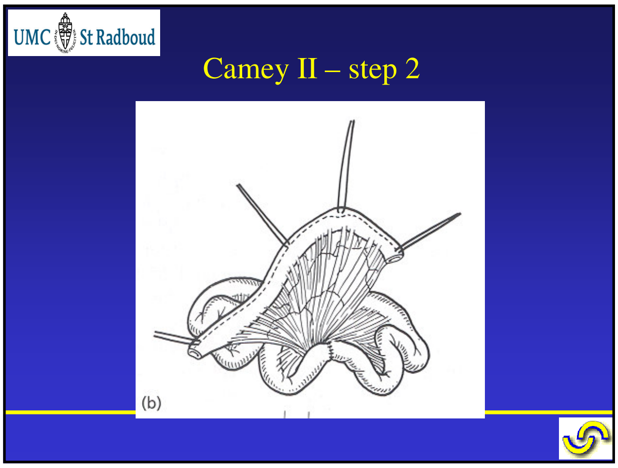
(intact non-detubularized ileum)

Camey II

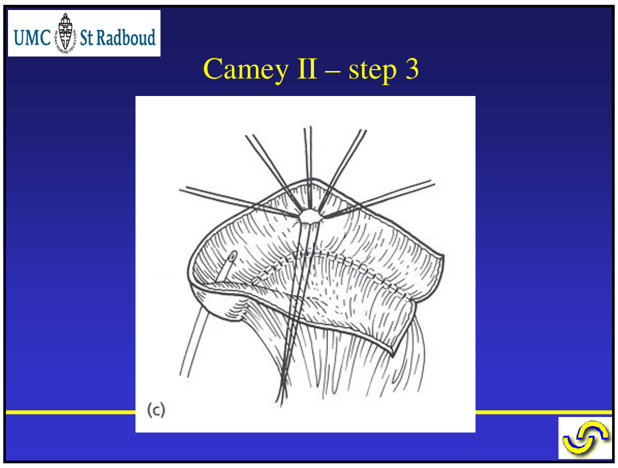
- 65 cm ileum
- Opened along anti-mesenteric border
- U-fold
- Suture of medial borders of the “U”
- Implantation of urethra
- Suture of lateral border of the “U”
- Implantation of ureters according to Le Duc



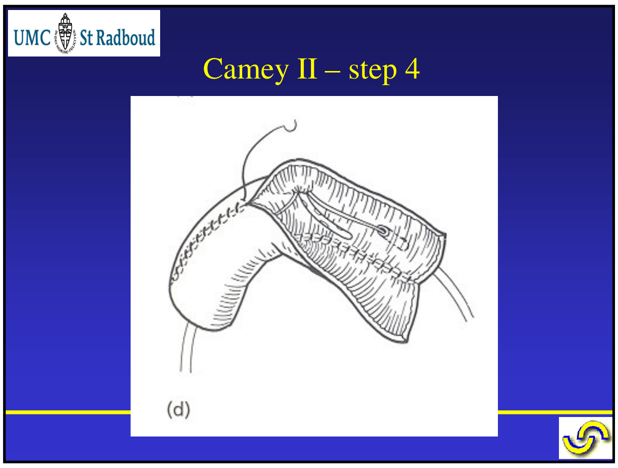
Camey II – step 1



Camey II – step 2

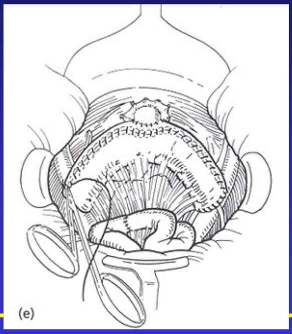


Camey II – step 3



Camey II – step 4

Camey II – step 5

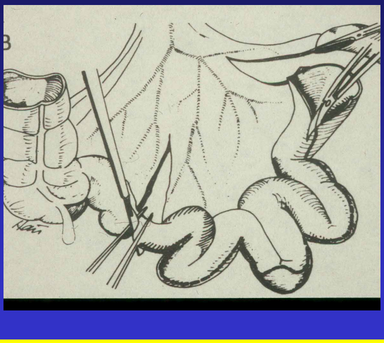


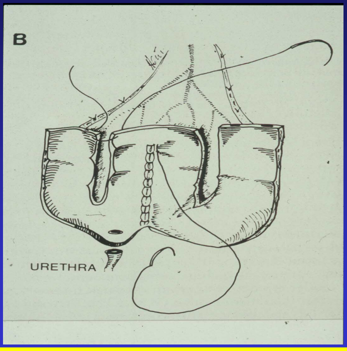
Ileal neobladder “Hautmann”

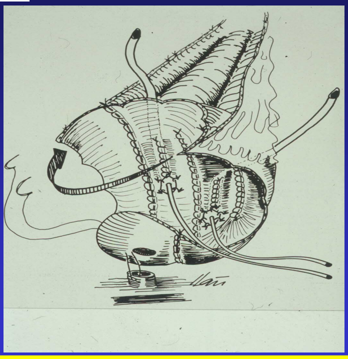
- Described in 1988
- Ileal segment 70 cm (15 cm proximal to ileocecal valve)
- Detubularization

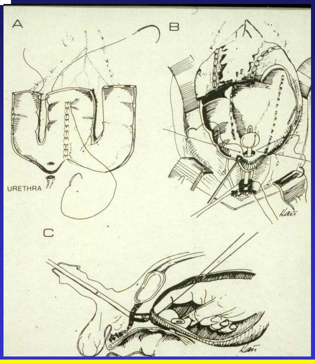
Ileal neobladder “Hautmann”

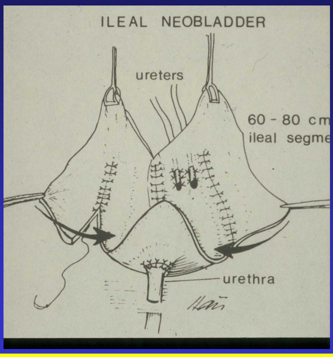
- Refashioned into “W” or “M” shape
- Closure of anti-mesenteric borders
- Ileourethral anastomosis (conform Camey I)
- Ureters implanted (Le Duc)
- Closure as a sphere

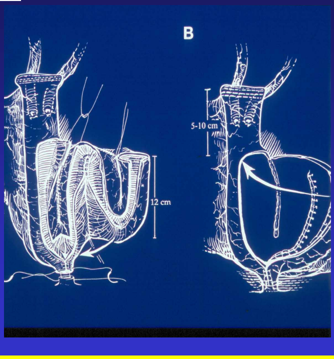


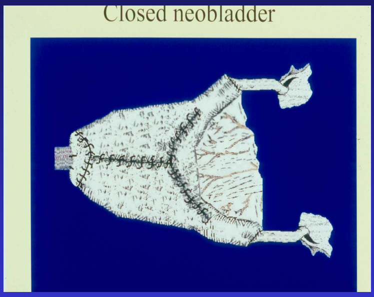








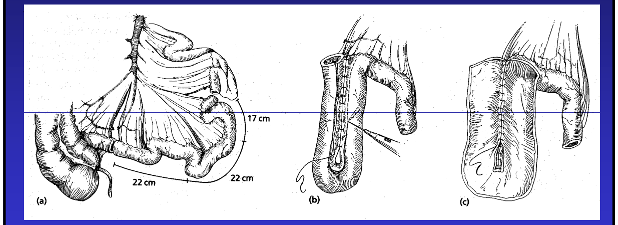


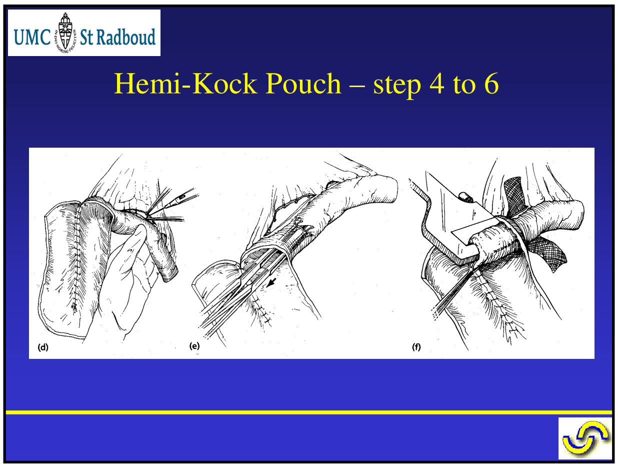


Orthotopic hemi-Kock pouch

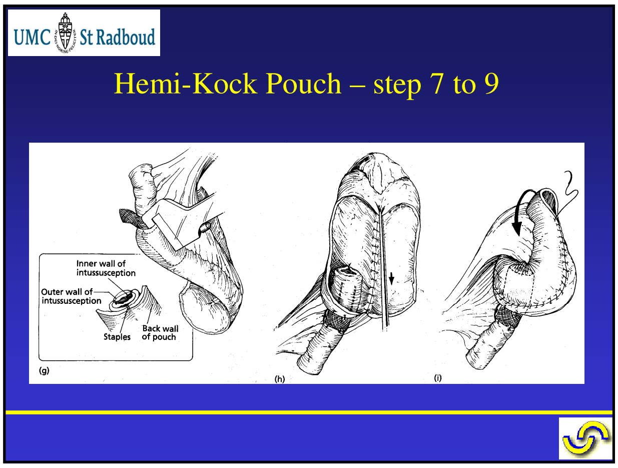
- Mesenteric window, formation of intussuscepted nipple
- 3 rows of staples for nipple fixation (2 rows inside, 1 row outside)
- Folding and closure of pouch
- Ureteroileal anastomosis and urethral anastomosis

Hemi-Kock Pouch – step 1 to 3

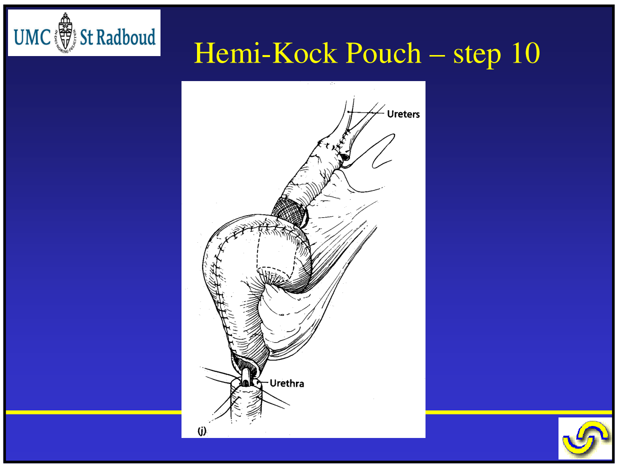




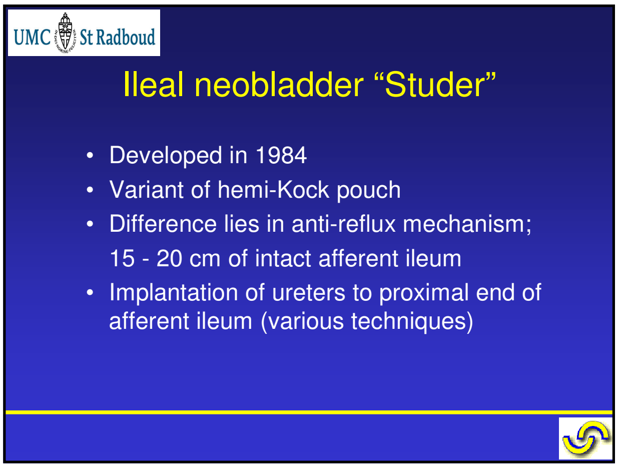
Hemi-Kock Pouch – step 4 to 6



Hemi-Kock Pouch – step 7 to 9

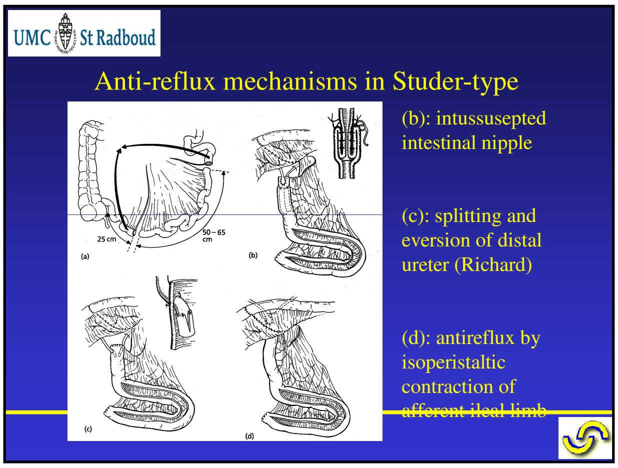


Hemi-Kock Pouch – step 10



Ileal neobladder “Studer”

- Developed in 1984
- Variant of hemi-Kock pouch
- Difference lies in anti-reflux mechanism; 15 - 20 cm of intact afferent ileum
- Implantation of ureters to proximal end of afferent ileum (various techniques)

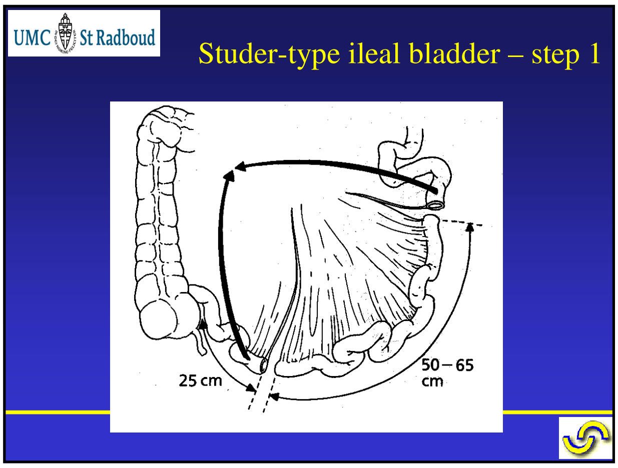


Anti-reflux mechanisms in Studer-type

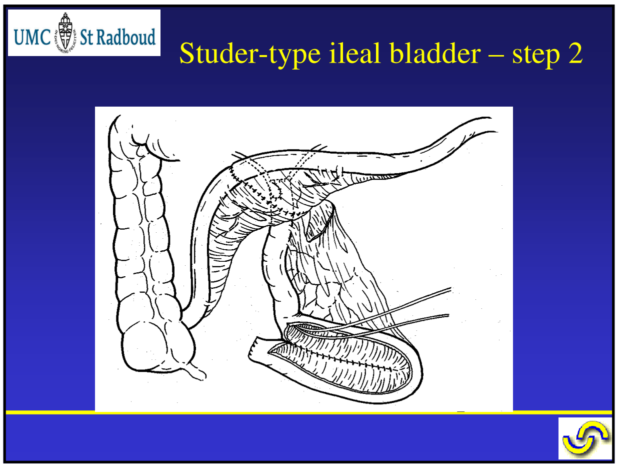
(b): intussusepted intestinal nipple

(c): splitting and eversion of distal ureter (Richard)

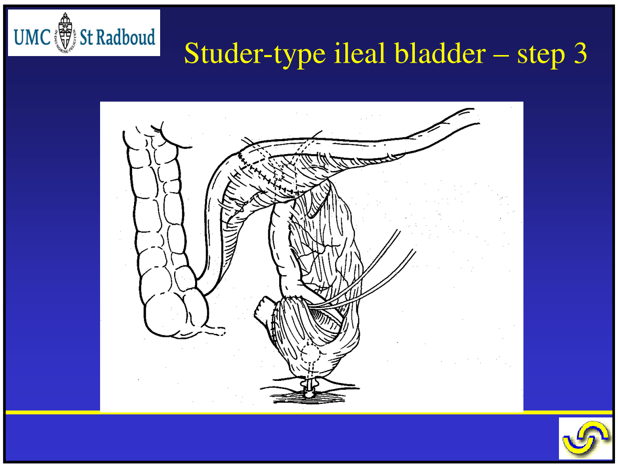
(d): antireflux by isoperistaltic contraction of afferent ileal limb



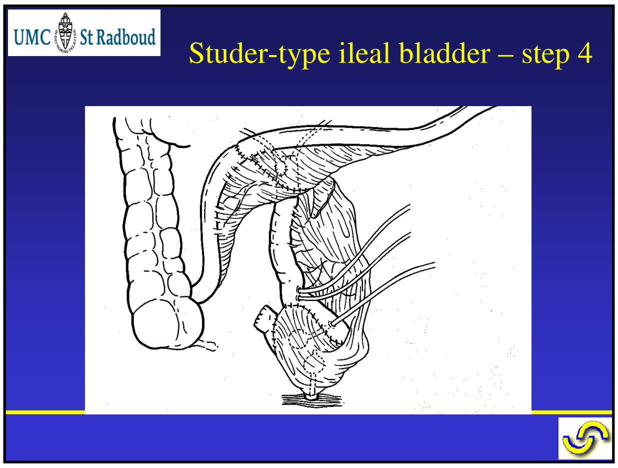
Studer-type ileal bladder – step 1



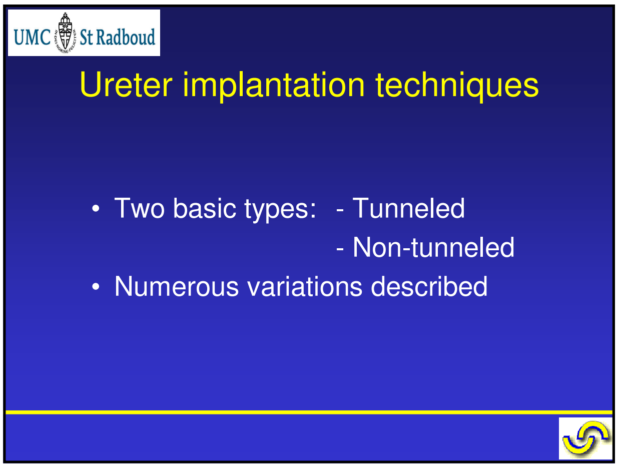
Studer-type ileal bladder – step 2



Studer-type ileal bladder – step 3

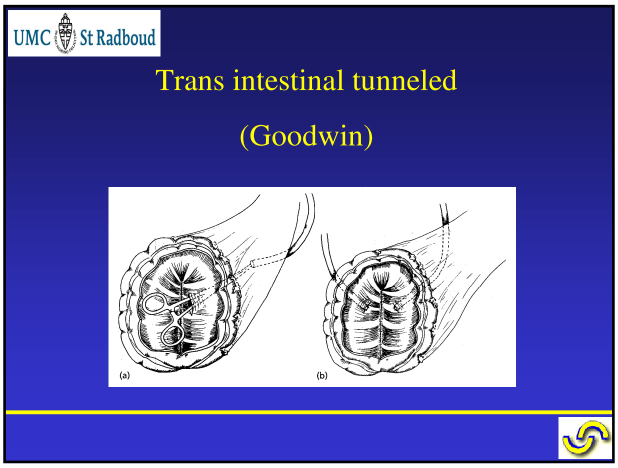


Studer-type ileal bladder – step 4



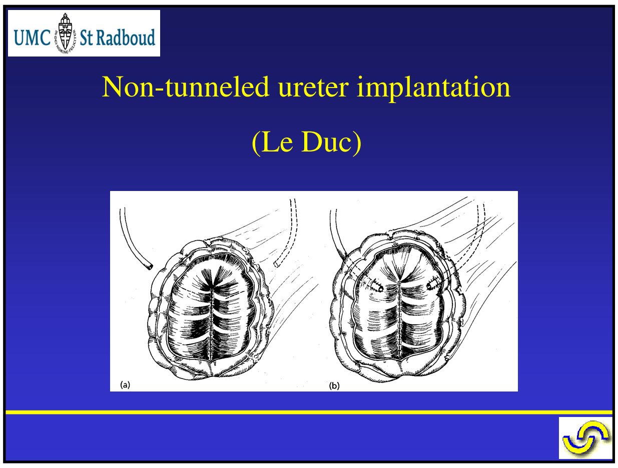
Ureter implantation techniques

- Two basic types: - Tunneled
  - Non-tunneled
- Numerous variations described



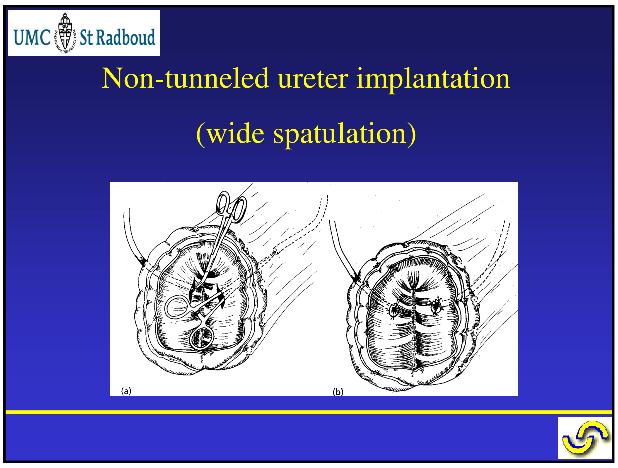
Trans intestinal tunneled

(Goodwin)



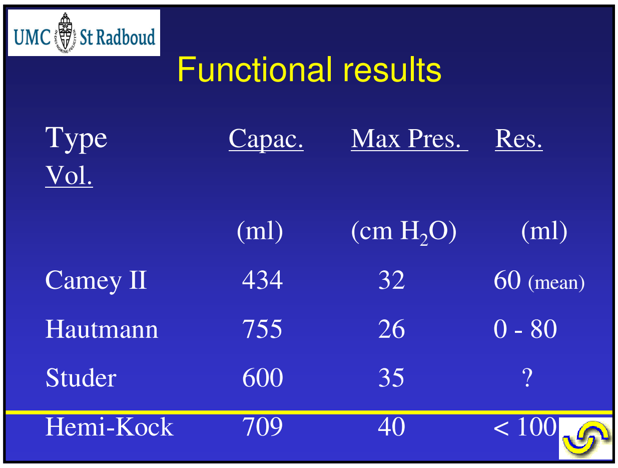
Non-tunneled ureter implantation

(Le Duc)



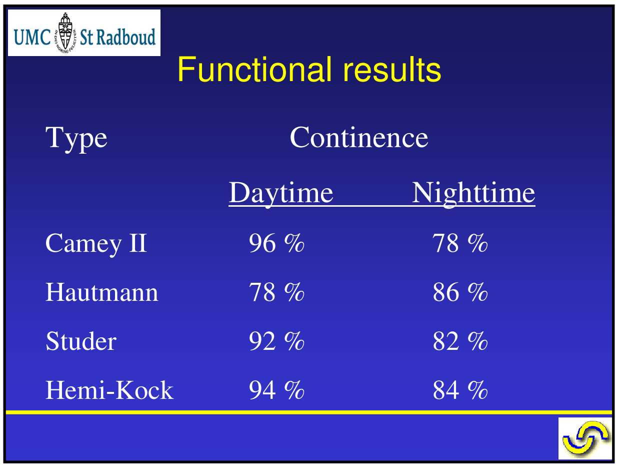
Non-tunneled ureter implantation

(wide spatulation)



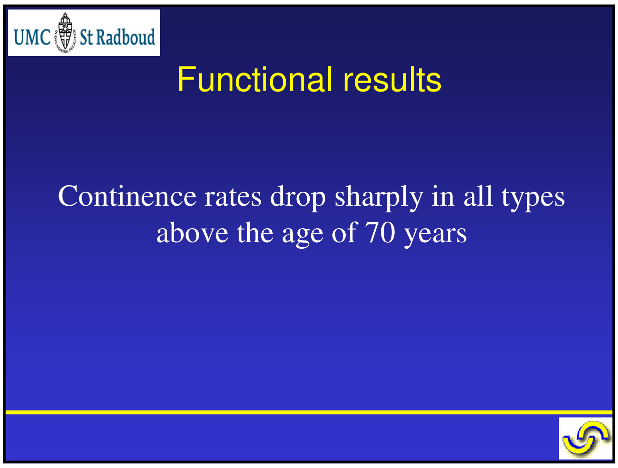
Functional results

Type	Capac.	Max Pres.	Res. Vol.
	(ml)	(cm H_2O)	(ml)
Camey II	434	32	60 (mean)
Hautmann	755	26	0 - 80
Studer	600	35	?
Hemi-Kock	709	40	< 100



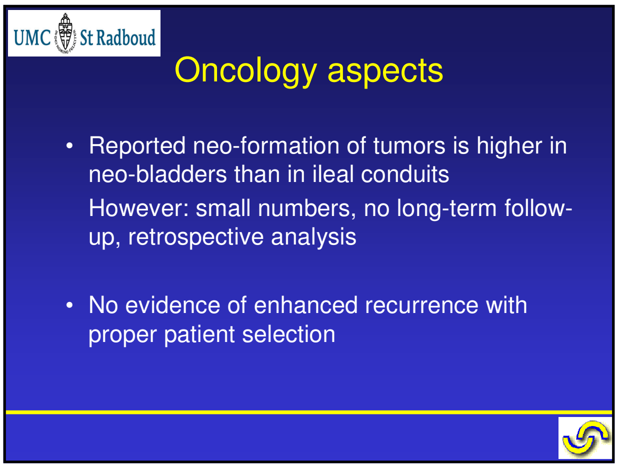
Functional results

Type	Continence	
	Daytime	Nighttime
Camey II	96 %	78 %
Hautmann	78 %	86 %
Studer	92 %	82 %
Hemi-Kock	94 %	84 %



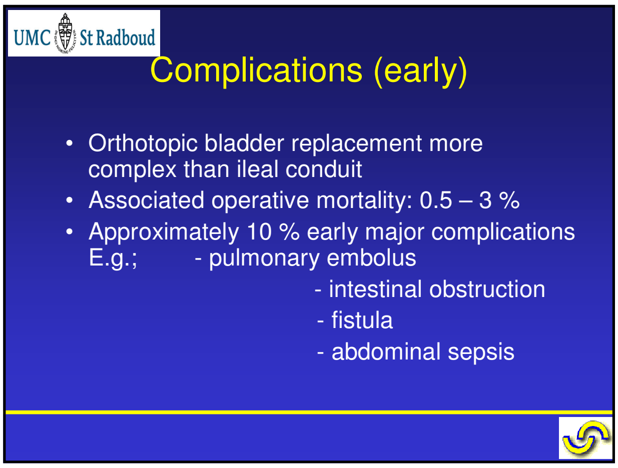
Functional results

Continence rates drop sharply in all types above the age of 70 years



Oncology aspects

- Reported neo-formation of tumors is higher in neo-bladders than in ileal conduits
  However: small numbers, no long-term follow-up, retrospective analysis
- No evidence of enhanced recurrence with proper patient selection



Complications (early)

- Orthotopic bladder replacement more complex than ileal conduit
- Associated operative mortality: 0.5 – 3 %
- Approximately 10 % early major complications
  E.g.; - pulmonary embolus
  - intestinal obstruction
  - fistula
  - abdominal sepsis

Complications (late)

Incisional hernia:	4 – 10 %
Ureteric obstruction:	3 – 10 %
Urethral and bladder neck strictures:	4 – 10 %
Bladder stones:	4 – 5 %
Recurrent urinary tract infections:	± 10 %

Metabolic changes

Two aspects:

- Risk of malabsorption
- Metabolic impact of using gut in urinary tract

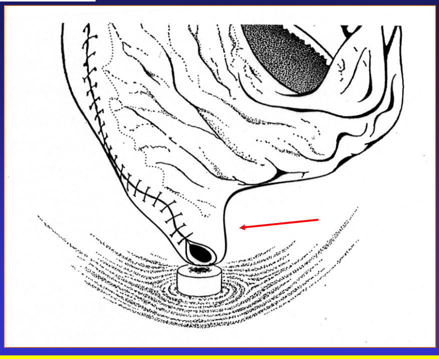
Metabolic changes

- Hyperchloraemic acidosis → inhibition of reabsorption of calcium and production of 1,25 DHC → Risk of bone demineralisation
- Vitamin B12 deficiency → malabsorption of fat and fat-soluble vitamins
- Diarrhoea

Metabolic changes

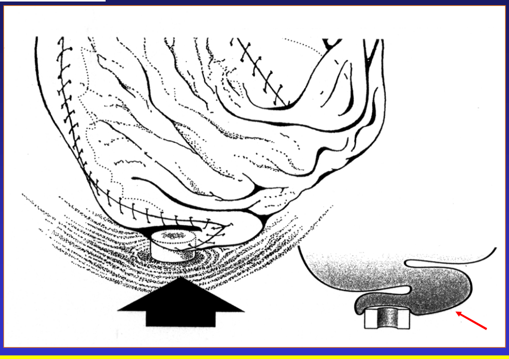
Most patients have mild, well compensated, hyperchloraemic acidosis without any other clinical abnormalities

”RE-TUBULARISATION”



STUDER, 2005

”POUCHOCELE”



- **INSUFFICIENT EVIDENCE (>LEVEL 3) TO PROVE A SPECIFIC POUCH TECHNIQUE SUPERIOR TO OTHERS**
- **END-SIDE REFLUXING URETERO- INT. ANASTOMOSES TO AFFERENT LIMB OF LOW-PRESSURE ORTHOTOPIC POUCH HAVE LOWEST COMPLICATION RATE**

SIU ICUD CONSENSUS, UROLOGY 69(S4): 17, 2007

Department of Urology
Radboud University Nijmegen Medical Centre
The Netherlands

Conclusions

- No form of bladder replacement (or conventional urinary diversion) is free of problems
- Bladder replacement offers a chance to a more normal life
- Bladder replacement should be offered to all suitable patients scheduled for cystectomy
- No impairment to oncologic rules with correctly selected patients

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How sparing can we be??

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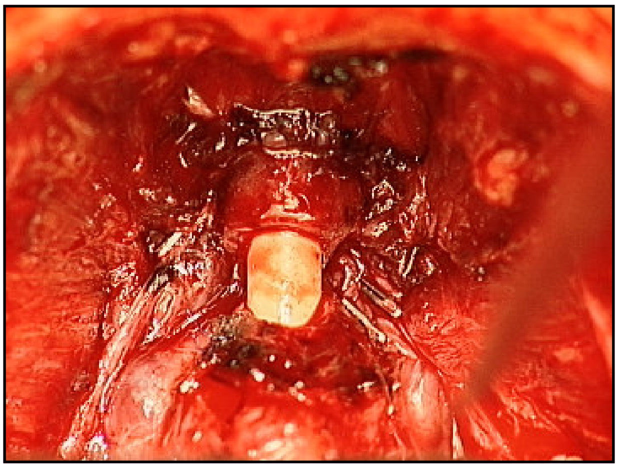
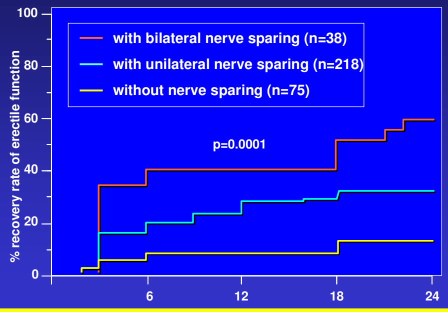


RECOVERY OF ERECTILE FUNCTION AFTER ORTH. NEOBLADDER



KESSLER, J.UROL. 172:1323, 2004

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TRENDS TO IMPROVE NEOBLADDER

- NERVESPARING TECHNIQUES
- AVOIDING EXCESS POUCH VOLUME
- USING SHORTER BOWEL SEGMENTS
- NON-REFLUXING UI-ANASTOMOSES

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”IN 2007 ALL PATIENTS UNDERGOING CYSTECTOMY ARE NEOBLADDER CANDIDATES ...”

”... THE CHALLENGE IS TO IDENTIFY THE LESS IDEALLY SUITED”

R. HAUTMANN, UROLOGY 69 (S4):17, 2007

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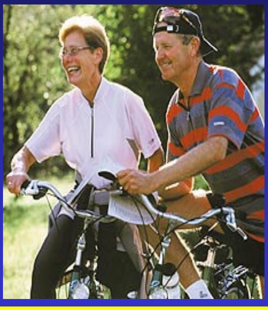
Neobladders & Complications
Take home messages...

- *Patients with neobladders need a meticulous and life long FU to early detect:*
  - anatomical problems (e.g. ureteral stenosis)
  - metabolic problems (e.g. acidosis)
  - functional problems (e.g. residual urine)

... in the era of orthotopic neobladders, radical cystectomy



is not synonymous with mutilation